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(54) POLYCRYSTALLINE MGO VAPOR DEPOSITING MATERIAL

(57)Abstract:

PROBLEM TO BE SOLVED: To scarcely cause splash and form an MgO film to be formed into an almost uniform thickness even by depositing a vapor by an electron beam vapor deposition method.

SOLUTION: This MgO vapor depositing material comprises a sintered compact pellet of a polycrystalline MgO having ≥99.90% of MgO purity, especially ≤30 ppm content of carbon and ≥98% relative density. Furthermore, contents of impurities contained in the sintered compact pellet of the polycrystalline MgO are respectively ≤150 ppm each of Si and Al impurities expressed in terms of element concentrations, ≤200 ppm of Ca impurity expressed in terms of the element concentration, ≤50 ppm of Fe impurity expressed in terms of the element concentration, ≤10 ppm each of Cr, V and Ni impurities expressed in terms of the element concentrations, ≤20 ppm each of Na and K impurities expressed in terms of the element concentrations and ≤150 ppm of Zr impurity expressed in terms of the element concentration.

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* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]
[Claim 1] Polycrystal MgO vacuum evaporationo material which the amount of carbon is 30 ppm or less in 99.90% or more of MgO purity, and relative density becomes from the sintering object pellet of 98% or more of polycrystal MgO.
[Claim 2] Polycrystal MgO vacuum evaporationo material according to claim 1 which the impurity of Si and aluminum contained in the sintered compact pellet of Polycrystal MgO is 150 ppm or less by element concentration, respectively, the impurity of calcium is 200 ppm or less by element concentration, the impurity of Fe is 50 ppm or less by element concentration, the impurity of Cr, V, and nickel is 10 ppm or less by element concentration, respectively, and the impurity of Na and K is 20 ppm or less by element concentration, respectively, and is 150 ppm or less in the high impurity concentration of Zr.

[Translation done.]

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the polycrystal MgO vacuum evaporationo material suitable for membrane formation of the MgO film of the plasma display panel of AC mold.
[0002]
[Description of the Prior Art] In recent years, various kinds of researches and developments and utilization of a flat-surface display including liquid crystal (Liquid Crystal Display:LCD) are remarkable, and the production is also increasing rapidly. Also about the color plasma display panel (PDP), the movement toward the development and utilization is active recently. It is easy to enlarge PDP, it is in the minimum distance of the big screen flat TV for Hi-Vision, and the prototype of PDP of the 40 inches class of diagonal is already advanced. PDP is classified into AC mold with which a metal electrode is covered with glass dielectric materials in respect of electrode structure, and DC mold which the metal electrode has exposed to discharge space.
[0003] Since the glass dielectric layer was exposed to discharge space, it was exposed to direct discharge, the front face of a dielectric layer changed with sputtering of an ion bombardment, and breakdown voltage was rising at the beginning [of development of this AC mold PDP]. Therefore, the attempt which uses various oxides with the high heat of sublimation as the protective coat of this dielectric layer was made. Since this protective coat is in contact with the gas for direct discharge, it is bearing the important role. That is, the properties for which a protective coat is asked are low discharge voltage, the sputtering-proof nature at the time of discharge, the responsibility of quick discharge, and insulation. MgO is used for a protective coat as an ingredient which fulfills these conditions. The protective coat which consists of this MgO protects the front face of a dielectric layer from sputtering at the time of discharge, and is carrying out work important for the reinforcement of PDP.
[0004] The MgO film formed as current and the above-mentioned protective coat of the AC mold PDP by the electron beam vacuum deposition which makes the crushing article of a single crystal MgO vacuum evaporationo material is known. The MgO film by this electron beam vacuum deposition can be formed at the above high speed by 1000A/. Moreover, the emission ratio of secondary electron increases and is said for driver voltage to also decrease, so that the amount of crystal orientation of the formed MgO film of the field (111) where the film which carried out orientation to the field (111) can drive with the lowest sustaining voltage, and exists in the film further increases. in addition, the crushing article of the above-mentioned single crystal MgO -- purity -- 98% or more of MgO clinker, and light-burned -- after considering as an ingot by fusing MgO (MgO sintered below 1000 degrees C) with an electric furnace (arc furnace), i.e., electromelting, it is manufactured by crushing and taking out the single crystal section from this ingot.
[0005]
[Problem(s) to be Solved by the Invention] However, in the electron beam vacuum deposition using the crushing article of the above-mentioned conventional single crystal MgO as vacuum evaporationo material, in order that a single crystal MgO may manufacture by arc melting with a carbon-electrode

rod, the 100 ppm or more of the amounts of carbon in a single crystal exist, and the most amount of carbon exists also in the film vapor-deposited with the electron beam. Since electronic collision frequency would fall and stick that it is easy to incorporate in the film the charge which exists near the film surface layer (being easy to carry out a trap) at the time of plasma discharge and the emission factor of a secondary electron would fall if carbon exists considerably in the MgO film, there was a problem which must make discharge voltage high. Moreover, in order to give high energy locally to vacuum evaporationo material, scattering (splash) of the vacuum evaporationo material of fines occurred, and there was fault to which vacuum evaporationo effectiveness falls. Although it is thought that enlargement of vacuum evaporationo material is effective in prevention of generating of this splash, a single crystal MgO cools a large-sized ingot as that manufacture process through the condition of carrying out long duration natural neglect considerably after electric melting, and has the process which crushes, takes out and carries out the particle size regulation of the single crystal part from that ingot further. A fresh crushing side has high activity in that case, and since the moisture and carbon dioxide gas in atmospheric air adhere over long duration, it is the vacuum treatment before vacuum evaporationo, and since these adhering moisture and carbon dioxide gas are emitted considerably, degassing takes most time amount, and it is regarded as questionable when improving productivity. It was difficult to be stabilized with the sufficient yield and to secure a big particle from the present particle size of 1-5mm in the grinding article. Moreover, in the electron beam vacuum deposition using the crushing article of the above-mentioned conventional single crystal MgO as vacuum evaporationo material, it was difficult to form the MgO film to homogeneity to the glass dielectric layer of a large area, and the problem was in thickness distribution. Consequently, when the glass dielectric layer which formed the MgO film was included in PDP, there was a trouble of electrical characteristics, for example, breakdown voltage, and sustaining voltage having become high, or changing.

[0006] on the other hand -- a MgO clinker and light-burned -- since MgO is using as the raw material MgCl2 obtained from seawater in many cases and comparatively many impurities, such as calcium, Si, and Fe, are contained in this MgCl2, these impurities remain in a single crystal MgO. Moreover, in the ingot in the manufacture process of a single crystal MgO, the amount of impurities was increasing from the core of this ingot continuously toward the surface section, the purity of a product was changed very easily depending on how to take out the single crystal section for this reason, and there was a trouble lacking in the stability and dependability of purity of a single crystal MgO.

[0007] In order to cancel these points, it replaces with a single crystal MgO and the approach using Polycrystal MgO is also considered. However, in the polycrystal MgO of the high density which carried out eburnation by addition of various sintering acid, when there is a trouble that a defect exists in the grain boundary systematically and purity was made high, there was a trouble that a consistency became low. On the other hand, when the high structure of the binding energy between atoms which does not almost have a defect irradiated an electron beam on the occasion of vacuum evaporationo, unless the electron of high energy collided considerably, in swing OFF, neither Mg nor the atom of O could jump out of association easily, and since there were few amounts of elutriation, as soon as it raised the power of an electron beam for making a membrane formation rate quick, there was a limitation. Consequently, when the MgO film was formed to the glass dielectric layer with electron beam vacuum deposition using these polycrystal MgO vacuum evaporationo material, the amount of orientation to a crystal orientation (111) side decreased, and since the electrical property when including this glass dielectric layer in PDP fell, Polycrystal MgO was not able to be used as vacuum evaporationo material.

[0008] Even if it vapor-deposits the purpose of this invention with electron beam vacuum deposition, it is to offer the polycrystal MgO vacuum evaporationo material which is a high speed and can form membranes to homogeneity, without generating a splash. Another purpose of this invention is to offer the polycrystal MgO vacuum evaporationo material which can improve the film property of the formed MgO film.

[0009]

[Means for Solving the Problem] MgO purity is [the amount of carbon] 30 ppm or less at 99.90% or more, and the relative density of invention concerning claim 1 is the polycrystal MgO vacuum

evaporationo material which consists of a sintered compact pellet of 98% or more of polycrystal MgO. In the polycrystal MgO vacuum evaporationo material indicated by this claim 1, if MgO film, such as the AC mold PDP, is formed using the polycrystal MgO vacuum evaporationo material of a high grade and high density, membrane formation by which the splash was stabilized at high speed very few can be performed. moreover -- since thickness distribution can be improved -- abbreviation -- the MgO film which has uniform membraneous quality can be obtained.

[0010] Invention concerning claim 2 is invention concerning claim 1, and are further contained in the sintered compact pellet of Polycrystal MgO. The impurity of Si and aluminum is 150 ppm or less by element concentration, respectively. The impurity of calcium is 200 ppm or less by element concentration, and the impurity of Fe is 50 ppm or less by element concentration. The impurity of Cr, V, and nickel is 10 ppm or less by element concentration, respectively, and by element concentration, the impurity of Na and K is 20 ppm or less, and is characterized by being the high impurity concentration of 150 ppm or less of Zr, respectively. In the polycrystal MgO vacuum evaporationo material indicated by this claim 2, since the impurity contained in the formed MgO film decreases extremely, the film property of this MgO film improves.

[0011]

[Embodiment of the Invention] Next, the gestalt of operation of this invention is explained in detail. Especially the polycrystal MgO vacuum evaporationo material of this invention is polycrystal MgO vacuum evaporationo material which the amount of carbon is [MgO purity] 30 ppm or less 99.90% or more, and relative density becomes from the sintering object pellet of 98% or more of polycrystal MgO.

[0012] A certain thing of the content of the impurity (Si, aluminum, calcium, Fe, Cr, V, nickel, Na, K, C, and Zr) contained in the sintering object pellet of Polycrystal MgO is desirable 850 ppm or less in total. Moreover, as for the individual content of the above-mentioned impurity, it is desirable that the impurity of Si and aluminum is 150 ppm or less by element concentration, respectively, the impurity of calcium is 200 ppm or less by element concentration, the impurity of Fe is 50 ppm or less by element concentration, the impurity of Cr, V, and nickel is 10 ppm or less by element concentration, respectively, the impurity of Na and K is 20 ppm or less by element concentration, respectively, and the impurity of Zr is 150 ppm or less by element concentration. Since dispersion arises in membraneous quality when each above-mentioned impurity exceeded the above-mentioned value by element concentration and the glass substrate which formed MgO vacuum evaporationo material with electron beam vacuum deposition is built into a panel, there are electrical characteristics, for example, the fault which driver voltage becomes high or becomes unstable. [0013]

[Example] Although an example and the example of a comparison are given for this invention and this invention is explained more concretely hereafter, this invention is not limited to the following examples, unless the summary is exceeded.

<Example 1> The polyethylene glycol (Mitsuhiro formation shrine PEG- 200) was first added 1% of the weight as a binder to MgO powder (MJ[by the Iwatani chemistry company]- 30, 99.9% of purity, 0.3 micrometers of mean diameters), and the slurry which makes ethanol a dispersion medium was adjusted to 72 % of the weight (viscosity of 400cps) of concentration. Subsequently, after carrying out wet blending of this slurry for 20 hours with a ball mill (ball use made of resin with a diameter of 10mm), spray drying was carried out with the spray dryer, and granulation powder with a mean particle diameter of 80 micrometers was obtained. The conditions of spray drying set the rotational speed of an atomizer (high-speed rotating disc) as 10000rpm, and set the inlet port and outlet temperature of heating gas as 100 degrees C and 60 degrees C, respectively. Next, the thin cylinder-like container (the bore of 155mm, height of 8mm) of CIP shaping equipment was filled up with the obtained granulation powder, and CIP shaping was carried out by 1500 kg/cm2. Furthermore, after having sintered two steps of this Plastic solid, i.e., putting into the electric furnace and sintering primarily at 1300 degrees C among atmospheric air for 2 hours, it sintered secondarily at 1650 degrees C for 2 hours. The programming rate to secondary sintering from primary sintering was 30 degrees C/hour, and the temperature fall rate after secondary sintering termination was 50 degrees C/hour. The disk of this sintering object was made into the example 1.

[0014] After carrying out wet blending of the slurry adjusted like the <example 2> example 1 for 24 hours with the ball mill which used the same ball as an example 1, spray drying was carried out with the spray dryer, and granulation powder with a mean particle diameter of 200 micrometers was obtained. The mold (the bore of 6mm, a depth of 3mm) of 1 shaft press equipment was filled up with this granulation powder, and 1 shaft press forming was carried out by 1000 kg/cm2. It manufactured like the example 1 except the above. This sintering object pellet was made into the example 2.
[0015] After carrying out wet blending of the slurry adjusted like the <example 3> example 1 for 24 hours with the ball mill which used the same ball as an example 1, spray drying was carried out with the spray dryer, and granulation powder with a mean particle diameter of 150 micrometers was obtained. The thin cylinder-like container (the bore of 155mm, height of 8mm) of CIP shaping equipment was filled up with this granulation powder, and CIP shaping was carried out by 1500 kg/cm2. It manufactured like the example 1 except the above. The disk of this sintering object was made into the example 3.
After carrying out wet blending of the slurry adjusted like the <example 4> example 1 for 1 hour in a stirrer mill (ball use made from ZrO2 with a diameter of 2mm), spray drying was carried out with the spray dryer, and granulation powder with a mean particle diameter of 200 micrometers was obtained. The mold (the bore of 6mm, a depth of 3mm) of 1 shaft press equipment was filled up with this granulation powder, and 1 shaft press forming was carried out by 1000 kg/cm2. It manufactured like the example 1 except the above. This sintering object pellet was made into the example 4.
[0016] After carrying out wet blending of the slurry adjusted like the <example 5> example 1 for 1 hour in the stirrer mill which used the same ball as an example 5, spray drying was carried out with the spray dryer, and granulation powder with a mean particle diameter of 150 micrometers was obtained. The mold (bore a depth of 3mm of 6mm) of 1 shaft press equipment was filled up with this granulation powder, and 1 shaft press forming was carried out by 1000 kg/cm2. It manufactured like the example 1 except the above. This sintering object pellet was made into the example 5.
[0017] After carrying out wet blending of the slurry adjusted like the <example 1 of comparison> example 1 for 48 hours with the ball mill which used the same ball as an example 1, spray drying was carried out with the spray dryer, and granulation powder with a mean particle diameter of 70 micrometers was obtained. Next, the thin cylinder-like container (the bore of 155mm, height of 8mm) of CIP shaping equipment was filled up with the obtained granulation powder, and CIP shaping was carried out by 1500 kg/cm2. Furthermore, this Plastic solid was put into the electric furnace, and it sintered at 1650 degrees C among atmospheric air for 3 hours. The disk of this sintering object was made into the example 1 of a comparison.
After carrying out wet blending of the slurry adjusted like the <example 2 of comparison> example 1 for 8 hours in a stirrer mill (ball use made from ZrO2 with a diameter of 3mm), granulation powder with a mean particle diameter of 40 micrometers was filled up with the spray dryer into the mold (the bore of 6mm, a depth of 3mm) of 1 shaft press equipment, and 1 shaft press forming of the 1000kg /was carried out by 2 cm. Sintering was performed like the example 1 of a comparison. This sintering object pellet was made into the example 2 of a comparison.
The crushing article of the single crystal MgO (99.3% of purity) manufactured by electromelting of the <example 3 of comparison> marketing was made into the example 3 of a comparison. The diameter of this crushing article was 3-5mm.
[0018] The purity of the disk of the sintering object acquired in (Evaluation a) relative density measurement examples 1-5 and the examples 1-3 of a comparison, a pellet, and a crushing article and relative density were measured, respectively. [<comparative study and Evaluation>] These results are shown in Table 1. in addition, purity -- the analysis value of an impurity -- computing -- relative density -- the inside of toluene, and Archimedes -- it measured by law. Moreover, in Table 1, the mean particle diameter of the disk of the sintering object of examples 1-5 and the examples 1-3 of a comparison and the manufacture conditions of a pellet, i.e., mixed processing of a slurry, and granulation powder and the sintering conditions of a Plastic solid were indicated. [0019]
[Table 1]

	製造条件					MgO焼結体	
	混合処理			造粒粉末の平均粒径	焼結条件	純度	相対密度
	ミル種類	ボール径 (mm)	混合時間 (時間)	(μm)		(%)	(%)
実施例1	ボール	5	20	80	二段焼結	99.9	99.6
実施例2	ボール	5	24	200	二段焼結	99.9	99.5
実施例3	ボール	5	24	150	二段焼結	99.9	99.7
実施例4	撹拌	2	1	200	二段焼結	99.9	99.8
実施例5	撹拌	2	1	150	二段焼結	99.9	99.9
比較例1	ボール	5	48	70	一段焼結 1650℃×3時間	99.2	97.0
比較例2	撹拌	3	8	40	一段焼結 1650℃×3時間	98.8	96.4
比較例3	市販電融により製造された単結晶MgOの破砕品					99.3	—

[0020] In the examples 1-5, there is no mixing of the impurity in a production process, the purity of a MgO sintering object ****ed to the MgO powder of a start raw material, it is 99.90% or more altogether, and eburnation of the relative density was carried out to 99% or more so that clearly from Table 1. On the other hand, in the example 2 of a comparison, since the time amount and the diameter of media which are mixed by the ball mill or the stirrer mill were unsuitable, the impurity mixed by the production process. Furthermore, examples 1 and 3 and the examples 1 and 2 of a comparison showed that the two-step sintering was more desirable than single step sintering about relative density.
[0021] (b) Atomic absorption and ICP (an inductive-coupling form plasma analysis method, Inductively Coupled Plasma emission spectrochemical analysis) analyzed the impurity contained in the sintering object of the analysis example 3 of an impurity, the sintered compact of the example 2 of a comparison, and the crushing article of the single crystal MgO of the example 3 of a comparison, respectively. The result is shown in Table 2.
[0022]
[Table 2]

	不純物(ppm)										
	Si	Al	Ca	Fe	Cr	V	Ni	Na	K	C	Zr
実施例3	18	15	22	24	7	8	8	0.4	1.0	25	5
比較例2	20	17	30	25	7	8	8	0.5	1.1	29	800
比較例3	80	90	390	241	20	30	10	0.4	0.8	100	30

[0023] Although the concentration of impurities other than Zr was 30 ppm or less in the example 2 of a comparison, in the example 3, 800 ppm with the quite high concentration of Impurity Zr were shown to the concentration of an impurity having been less than 25 ppm, so that clearly from Table 2. Moreover, in the example 3 of a comparison, the concentration of Impurity calcium indicated the very high value to be 390 ppm. This is because aluminum, calcium, and Fe are contained so much in the raw material of the example 3 of a comparison and especially calcium is contained so much.
[0024] (c) In the crushing article of the single crystal MgO of the characteristic test of the MgO film which formed membranes and the sintered compact pellet of the discharge sex-test examples 2, 4, and 5, the sintering object pellet of the example 2 of a comparison, and the example 3 of a comparison, membranes were formed to the glass substrate with electron beam vacuum deposition, and five kinds of TEG (Test Element Group) substrates were produced. The TEG substrate was made by forming the MgO film with a thickness of 7000A on the same membrane formation conditions with the above-mentioned electron beam vacuum deposition, after having formed the substrate electrode which consists of an InSn compound oxide film by the photolithography at intervals of 100 micrometers on the glass

substrate (Corning **7059 glass) with a thickness of 3mm at the thickness of 1 micrometer, and width of face of 100 micrometers, and forming a glass layer with a thickness of 3 micrometers by reactant DC sputtering so that these substrate electrodes may be covered. In addition, for acceleration voltage, 15kV and a vacuum evaporationo pressure were [1x10 to 2 Pa and the vacuum evaporationo distance of the membrane formation conditions of the MgO film] 600mm.

[0025] The refractive index of the above-mentioned MgO film was measured first. With helium-Ne laser (wavelength of 6238A), the refractive index of the MgO film performed ERIPUSO measurement of one wave and two incident angles (55 70) to the film, and asked for it using analysis software. Next, the breakdown voltage of the above-mentioned MgO film was measured by the following approaches. Five kinds of TEG substrates were put on the heating sample base arranged in the vacuum bell jar of 500Torr (s) by Ne-5%Xe of a TEG substrate, and the substrate electrode was connected to the pulse power source, and it controlled to fixed temperature, measuring a TEG substrate with a thermocouple, and went up and went supply voltage, and the electrical potential difference which starts discharge was measured. A pulse power source is electrical-potential-difference adjustable in the range of 0-300V, and generates the pulse of pulse width sec of 10micro on the frequency of 66Hz. The refractive index of the MgO film and breakdown voltage are shown in Table 3.

[0026]

[Table 3]

	屈折率	放電開始電圧 (V)	成膜速度 Å/分	スプラッシュの有無
実施例2	1.74	140	8200	なし
実施例4	1.73	138	8500	なし
実施例5	1.74	135	8400	なし
比較例2	1.65	156	—	少しあり
比較例3	1.68	164	2750	あり

[0027] In the examples 2, 4, and 5, the refractive index improved or more with 1.7 to refractive indexes having been 1.65 and 1.68 in the examples 2 and 3 of a comparison so that clearly from Table 3. moreover, breakdown voltage -- examples 2, 4, and 5 -- the examples 2 and 3 of a comparison -- comparing -- 10-20 -- it turned out that it is [about V] low. Furthermore, as for the membrane formation rate of an example, the example about 3 times the value of of a comparison was acquired. This has a stacking tendency in the crushing article of the single crystal MgO of the example 3 of a comparison, when an electron beam hits, but with the sintering object pellet of the polycrystal MgO of an example, since there is no stacking tendency, it is because efficient membrane formation was attained. In addition, the spatter-proof nature when building into PDP the substrate which formed the MgO film using examples 2, 4, and 5 was also good, and driver voltage also fell.

[0028] (d) The sintering object pellet of the thickness distribution example 2 of the MgO film, the sintering object pellet of the example 2 of a comparison, and the crushing article of the single crystal MgO of the example 3 of a comparison were formed to the glass substrate with electron beam vacuum deposition like the above. Thickness distribution of this MgO film was measured by ERIPUSO of helium-Ne laser (6328A). This result is shown in Table 4. In addition, in Table 4, the ratio to the thickness based on glass substrates showed the thickness of each part. That is, thickness based on glass substrates was set to 1.0, and the ratio to this showed the thickness of each part.

[0029]

[Table 4]

	各部のMgO膜厚／ガラス基板中心のMgO膜厚			
ガラス基板中心からの距離(cm)	0	2	4	8
実施例 2	1.00	0.98	0.95	0.96
比較例 2	1.00	0.95	0.85	0.88
比較例 3	1.00	0.95	0.90	0.78

[0030] The percentage reduction (variation rate) of an example 2 was smaller than the examples 2 and 3 of a comparison so that clearly from Table 4.
[0031]
[Effect of the Invention] since according to this invention the amount of carbon is [MgO purity] 30 ppm or less especially 99.90% or more and relative density constituted polycrystal MgO vacuum evaporationo material from a sintering object pellet of 98% or more of polycrystal MgO, as stated above, if MgO film, such as the AC mold PDP, is formed using the polycrystal MgO vacuum evaporationo material of this high grade and high density -- a splash -- few -- efficient -- membranes can be formed -- abbreviation -- the MgO film which has uniform thickness can be obtained. Consequently, when the glass dielectric layer which formed the MgO film, for example is included in PDP since membranes can be formed to abbreviation homogeneity even if the membrane formation area of the MgO film is large, breakdown voltage and driver voltage can be fixed low and the electrical characteristics of PDP can be improved.
[0032] The impurity of Si and aluminum contained in the sintering object pellet of Polycrystal MgO by element concentration, respectively moreover, to 150 ppm or less To 200 ppm or less, the impurity of Fe by element concentration with element concentration for the impurity of calcium to 50 ppm or less the impurity of Cr, V, and nickel -- respectively -- element concentration -- 10 ppm or less, if it is set 20 ppm or less by element concentration and the impurity of Zr is set to 150 ppm or less for the impurity of Na and K by element concentration, respectively Since the impurity contained in the formed MgO film decreases extremely, the film property of this MgO film improves.
[0033] Furthermore, purity mixes the MgO powder, binder, and organic solvent whose mean diameter is 0.1-3 micrometers at 99.90% or more, and adjusts the slurry whose concentration is 45 - 57 % of the weight. If this granulation powder is put into a predetermined mold, it fabricates by the predetermined pressure and this Plastic solid is sintered at predetermined temperature after carrying out spray drying of the slurry and obtaining the granulation powder whose mean particle diameter is 50-300 micrometers The above-mentioned MgO purity can obtain the polycrystal MgO vacuum evaporationo material which the amount of carbon is 30 ppm or less, and relative density becomes from the sintering object pellet of 98% or more of polycrystal MgO especially 99.90% or more.

[Translation done.]